



REVIEW OF A FUCOID SEAWEED HARVEST PROPOSAL IN KANGIRSUK, NUNAVIK, QUEBEC

Context

In August, 2011, the Aboriginal Fisheries Division of Resource Management and Aboriginal Affairs in the Quebec Region requested that DFO Maritimes Science undertake a review of a document entitled "Management Plan and Data Bases for Harvest of Fucoid Seaweed Species in the area of Kangirsuk, Nunavik, Quebec" hereafter referred to as the Management Plan. DFO Science advice was requested on the sustainability of the operation, in order to inform the issuance of potential commercial licenses. Specifically, DFO Science was asked to evaluate:

- the state of the biomass based on the data and results provided,
- the maximum annual harvesting level for each of the listed sites on a 5 year basis,
- the regeneration rate of these two species in a Northern environment,
- the harvesting methodology established including the rotation of harvesting sites every five years,
- the biomass evaluation indicators and substratum deterioration,
- the implementation of the monitoring program (p. 40),
- medium and long term perspectives, including the ecosystem impact of a commercial harvest,
- other pertinent elements.

It was requested that a response be provided by December, 2011. Given the short timeframe for review, DFO's Science Special Response Process was used.

Overall, the methods and data provided in the management plan are on par with similar fucoid based harvests in Canada. The approach taken for the development of this new harvesting project is precautionary and provides some buffer for the lack of knowledge on certain aspects. It should allow for a well-managed *Fucus* fishery.

This Science Response report results from the Science Special Response Process of January 2012 on the Review of a Fucoid Seaweed Harvest Proposal in Kangirsuk, Nunavik, Quebec.

Background

For the past few years, DFO Resource Management has issued a scientific permit for the harvesting of two species of seaweed (*Fucus evanescens* and *Fucus vesiculosus*) in order to evaluate the commercial potential of derived products (powder, oils) destined for the cosmetic industry. The harvest of 20 metric tons of humid seaweed has been authorised annually in the region of Kangirsuk, Nunavik (Quebec). This is a manual harvest conducted at lowtide by the local residents on behalf of the proponent. The

proponent would like to obtain a commercial harvest permit for 2012. They recently provided a 5-year Management Plan along with scientific data gathered in Nunavik in the last few years justifying the commercial potential of this resource. In order to submit scientific advice and a recommendation to the Nunavik Marine Region Wildlife Management Board (under the Nunavik Inuit Land Claims Agreement), the Resource Management Branch requires scientific advice on the Management Plan and scientific results gathered to date.

Response

Ecosystem Impact of a Commercial Harvest

As the Management Plan suggests, when seaweed is harvested, it is not just the plant that is removed but also the fish habitat value (as defined by the *Fisheries Act*) and the donation that plant makes to food webs (herbivore based and detrital). With this in mind, annual harvest rates must be low in order to protect the ecosystem services provided by seaweeds.

An annual, area based 17% or lower removal of fucoid plants based upon accessible / harvestable biomass will likely protect these ecosystem services in southern Canada. That rate is based largely on research performed on *Ascophyllum* in Atlantic Canada; some of the publications that support this are listed in the Management Plan. It can be assumed that in northern Canada, growth rates for both seaweeds and their associated invertebrate fauna will be lower, suggesting that a harvest rate of <17% should be employed.

The Management Plan does not mention by-catch issues. A by-catch survey needs to be performed to determine how many invertebrates (esp. snails) are removed along with the harvested *Fucus*, and if any of these invertebrates are of special concern (e.g. rare, slow growth rates, important in food web, etc.).

Assessment of Fucoid Biomass

The Management Plan methods and data indicate a reasonably healthy, although not overwhelmingly dense, growth of *Fucus* in the areas intended for harvest. The present 'state of the *Fucus* biomass' appears to be good. However, the seaweed biomass on any particular shore can vary greatly on an annual basis. Resource managers would be well advised to audit the proponents biomass survey results on an annual basis.

Annual Harvesting Level

Data in Table 1 of the Management Plan (and other comments on subsequent pages) indicates that harvesters in Kangirsuk can go beyond a 17% exploitation rate if they are not controlled by area based quotas. This means that the harvest must have ongoing 'total harvestable biomass' estimates to determine quota rates. Local loss of biomass by ice scour and storms, plus the five years required for individual plants to reach harvestable size, requires that the total harvestable biomass estimates must be performed quite regularly (if not annually). The satellite imagery / ground survey system

described in the plan for biomass estimates is not simple or inexpensive. Similar methods are used for the *Ascophyllum* harvest in New Brunswick and Nova Scotia.

The Management Plan states that: "the harvest areas need to be assessed prior to each harvesting season to deal with annual variability in local abundance and to prepare the area for harvester access (re implementation)" (p. 38). It is unclear whether these assessments would follow the same methods as the original biomass estimates. A relatively rigorous method will need to be employed, for the reasons mentioned above.

The 10% exploitation rate plus 'discount' system suggested in the plan for the *Fucus* harvest in the Kangirsuk area should be precautionary and protect the ecosystem services provided by the plants.

Regeneration Rate

Page 15 of the Management Plan indicates that it takes five years for individual plants to reach harvestable size. If the commercial harvest is to proceed, detailed long term tagging studies should be performed to refine this time estimate for harvested and non-harvested areas. The management plan / annual harvest level may need to be adjusted pending these results.

Harvesting Methodology

The proposed 'hand cut' harvest method should work well in a rocky area, provided ATV and other vehicle use is limited (to prevent trampling and other disturbance of the shore). Mechanical harvesters (both floating and land based) should be avoided. The annual movement of harvest from one management unit to the next is precautionary and well advised.

Implementation of the Monitoring Program

The monitoring program suggested in the plan seems reasonable and should assist in evaluating biomass and substrate deterioration. However, it is unclear what the management action would be if holdfast presence (i.e. harvesting of whole plants) is 'high'. The criteria for high, medium, or low holdfast presence have not been defined. Someone needs to determine if a certain percentage of holdfast presence in the harvest leads to lowered biomass in future years. A management rule concerning the presence of holdfasts in the harvest may be prudent.

Conclusions

Overall, the methods and data provided in the management plan are on par with similar fucoid based harvests in Canada. The approach taken for the development of this new harvesting project is precautionary and provides some buffer for the lack of knowledge on certain aspects. It should allow for a well-managed *Fucus* fishery.

However, it may be advisable to conduct a more detailed science review of the program (assuming resources are available) as it progresses, and a discussion of the

management approach (i.e. is an area-based quota the best way to prevent over-exploitation at the small scale) may be warranted.

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